

Date: September 26, 2005

To: Jim Anderson, DEQ NWR, Portland Harbor Project Manager

From: Jennifer Peterson, DEQ NWR, Portland Harbor Section, Toxicologist

RE: Portland Harbor RI/FS Field Sampling Plan: Round 2 Sampling of Benthic Invertebrate Tissue, September 9, 2005, Prepared for The Lower Willamette Group by Windward Environmental LLC

Sections 1-2:

Corbicula is a filter-feeding organism. Therefore, collection and analysis of these organisms from the field is representative of particle concentration and accumulation at the sediment surface water interface. Collection of contaminant concentrations in clams is relevant in assessing risk to clams themselves and to assess dietary and food chain risk to those that feed on clams (this helps meet the first and second objective, Page 2). In order to accomplish this objective, I would collect clams from the field where they can be found. If they cannot be found, I would argue that the only way to truly represent their exposure would be to place clams in-situ and subsequently analyzed tissue.

Bioaccumulation tests using clams in the laboratory would likely not be representative of the Portland Harbor environment, as replicating filter-feeding exposure in the lab is difficult, and certainly would not be representative the accumulation of a true benthic in fauna organism. If we are to proceed with laboratory tests using *Corbicula*, sufficient concurrent tests of field collected and laboratory tissue need to be done to better understand differences in exposure and subsequent tissue concentrations between these two exposure regimes.

The reconnaissance also showed the presence of freshwater mussels at several locations. Given their potentially long life span (some up to 100 years), and presence in the harbor, collection of these species should also be contemplated. Their larger size would make tissue collection from the harbor easier, and would add to our knowledge of field collected in-fauna (and given that we only have *Corbicula* so far says a lot). It is likely that many species of wildlife (esp. mink and otter) and fish (esp. sturgeon and suckers) feed on these species, and adequate representation in the food web and dietary model would increase confidence in the ecological risk assessment. One source quotes “although many mussel species are sensitive to pollution and habitat disturbance some can tolerate moderate human disturbance and exist near densely populated areas such as Seattle and Portland.”

Section 2.2 and Section 3.1: Correlating field collected tissue concentrations with the correlating sediment which the clam was exposed to may be difficult. If sediment and fines are collected intact from the benthic sledge, it may be better to use that sediment for analysis in order to obtain appropriately co-located sediment (before water filtering and sieving). If this is not possible, the top sediment layer should be sampled (not down to 30 cm). Clams would be exposed to the surface concentration.

What are the additional sediment criteria to be met from the Round 2 FSP?

What are the preliminary tests mentioned here?

Not all stations sampled in the Round 2 sediment sampling were at 1.88% OC. Since obtaining adequate sediment is correlated with the sediment's organic carbon content, therefore, organic carbon content should be estimated at each location before sampling. If this cannot be done, we should use the lowest OC estimate to ensure enough sediment is collected at each location.

Section 3.2.3, Sample Shipping: The text states here that “if shipping takes longer than 24 hours, samples will be frozen”. I am not sure if they are talking tissue or sediment, but the freezing of sediment is not recommended.

They are recommending one field replicate – this should be increased given that we are conducting biological testing.

Section 4.1, Page 18, Analytical laboratory sample Processing: The text states “upon completion of each bioaccumulation test (*Lumbriculus* or *Corbicula*), the invertebrate tissue collected will be composited across replicates to obtain one invertebrate tissue sample per station that will be forwarded for the full suite of chemical analyses used for field-collected clam tissue”. This sentence is confusing –surely it isn't proposed to composite lab and field collected tissue to constitute a composite?

Table 4-1, Tissue, Footnote “1”: I realize we may have limited tissue for field collected organisms, but matrix spikes and duplicates may be important in interpreting the analytical results.

Is Gina looking at this QAPP?

Section 4.2, Page 20, Chemical Analysis: Prioritization of analytes is currently skewed toward bioaccumulation assessment data quality objectives. I agree that is one important data need. However, the assessment of field collected invertebrate tissue for risk to the organisms themselves and as a dietary item for wildlife and fish species also identified data needs, which means we need to get some data on butyl tin compounds, metals and PAHs. Metals in particular are very difficult to model if we do not have site-specific information on bioavailability. We should make these analytes a priority in addition to food web model priorities.

Section 5.0, Reporting: It is difficult to understand how the data will be reported. All data should be reported in electronic format, and in addition I would request it be reported in SEDQUAL format.

Appendix C, Bioaccumulation Test Protocols, Page 28: I would like a little more time to review the *Corbicula fluminea* and the *Lumbriculus variegatus* 28-day sediment

bioaccumulation test protocol. I have not been able to look these over in detail. Has Todd Bridges or someone intimately familiar with running these tests looked the protocol over?

Figure 2-1, proposed Round 2 Benthic Invertebrate Tissue Sampling Locations: I think we should be adding more stations. It would be good to meet as a team and discuss objectives for placing stations. They could include fish and shorebird habitat areas, contaminant characteristics and concentrations, sediment type, river characteristics, etc. It would be good to think about some of this and place stations accordingly, as we did for the bioassay testing locations. Some quick additions to consider for the *Lumbriculus* test would be:

East bank just upstream of terminal 4 slip 3, downstream of terminal 4 slip 1, head of Schnitzer slip, bulk fuel facilities near Mobil Oil, GATX and ARCO, Reidell Cove (upstream of McCormick and Baxter), US Moorings, upstream of current GASCO location (BT010) closer to the Wacker / GASCO border, Willbridge Cove (downstream and upstream end), more samples in Swan Island (e.g. middle), and downstream and around Gunderson, east bank around RM10.

I would be better to discussion locations and objectives for sample placement as a team if possible.